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Numerical Simulations of Detections, Experiments and Magnetic Field Hall Effect Analysis to Field Torsion

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Abstract

Field torsion models are considered from the experiments realized in electronic-dynamical devices and magnetic censoring of a Hall Effect sensor to detect torsion under electrical restricted conditions and space geometry. In this last point, are obtained 2D and 3D-models of torsion energy, which enclose the field theory concepts related with torsion, and open several possibilities of re-interpretations that can be useful in technological applications in the future. Likewise, are considered some measurements that evidence the torsion as field observable. Through geometrical models obtained from theorems and other results are demonstrated the conjectures required to understanding of torsion, as a geometrical and physics invariant most important in the deep study of the Universe. Also, applications in astrophysics and cosmology of these geometrical models are obtained to show Universe phenomena understudy of torsion.

Keywords: field torsion models, Hall effect sensor, spectral torsion, torsion detection, torsion energy, magnetic field, spinning, spinors

1. Introduction

A deep study of torsion carry us to determine the spectral form of the torsion explored through energy signals that evidence the torsion as an primordial field born from the spins and fermion interaction of the matter-space interaction when the agitation of the space produces the fundamental material particles which create through duality particle/wave the matter in the Universe. This new spectral form that have been defined from the curvature energy concept [1, 2], and expressed as the value of integrals on cycles of a space, come from a generalization of curvature in analysis and integral geometry called integral curvature [3, 4], and obtained through co-cycles (values of the integrals) in a tempered distributions topological space.

After, and applying this new form of curvature to explore and measure several phenomena in the space-time, furthermore of establish a Universe theory through integrals, have been obtained curvature of the space-time in the macroscopic levels as well as microscopic levels, where in this second item, have been obtained results referent to the creation of gravity and matter in the Universe [5], considering the

causes and origin of these and the evolution of the Universe, being the curvature energy $\kappa(\omega_1, \omega_2)$, an theoretical and practical element to consider in all modern Universe studies, and also the technological applications derived of these as corollaries of the great curvature energy theory.

As has been mentioned, the microscopic phenomena in the universe are the causes and are the things that give origin to the gravity and thus to the matter such as is known, through a large process in the Universe development. Likewise, an field observable that result of the microscopic interactions from particles spin level is the field torsion, which let in evidence much other space-time phenomena as the inflation, possibly the role of neutrinos, the baryogenesis, the proliferation of **H**-particles and the form of evolution of all sidereal bodies, which in their different steps show mechanism where curvature and torsion are geometrical invariants that give meaning to the evolution of these sidereal objects and possibly to explain the role of the Higgs boson, the meaning of the dark matter and more.

The present chapter will explain and expose some theoretical models, numerically obtained in 2D and 3D-dimensions of torsion and its meaning in field theory and the intrinsic study of torsion as field observable, as geometrical invariant and possible central concept to the new and future technologies that will be required to the human survival.

2. Numerical mathematical models: field torsion, torsion energy, spinors

The torsion is a double curvature of a space or body, which is result of interaction of two fields, where one field is the electromagnetic field and other a field relative to the matter, which is the gravitational field in a wide sense (even considering the quantum gravity).

Likewise, as mentioned in the introduction, the torsion born from the matter spins which under the action of the electromagnetic field produce spin-waves whose geometrical invariants are spinors in the invariant theory [6, 7] (see **Figure 1**).

This has been formulated in a first conjecture (**Figure 2**).

Conjecture 2.1. The curvature in spinor-twistor framework can be perceived with the appearing of the torsion and the anti-self-dual fields [7].

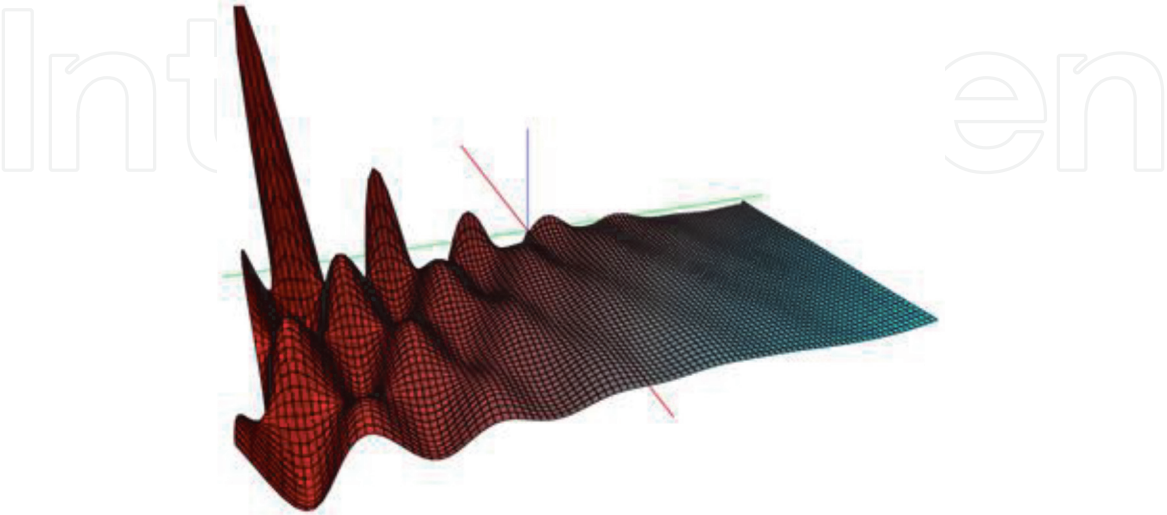


Figure 1.

Spinor image of spin-waves in torsion. This is a 2-dimensional model of spin-waves generated for a magnetic dilaton in a cylindrical-spiral trajectory of movement [8, 9]. In this 2-Dimensional surface $s(\omega_1, \omega_2)$ have been considered a mesh of 100 points of density and the corresponding torsion model is obtained as cylindrical solution $Z = \exp(0.5x)\text{BesselY}(0.1x, 2y)\sin(4x) + \text{BesselJ}(0.6x, 6)$, of the corresponding field equation $(P + \chi T)\varphi = 0$.

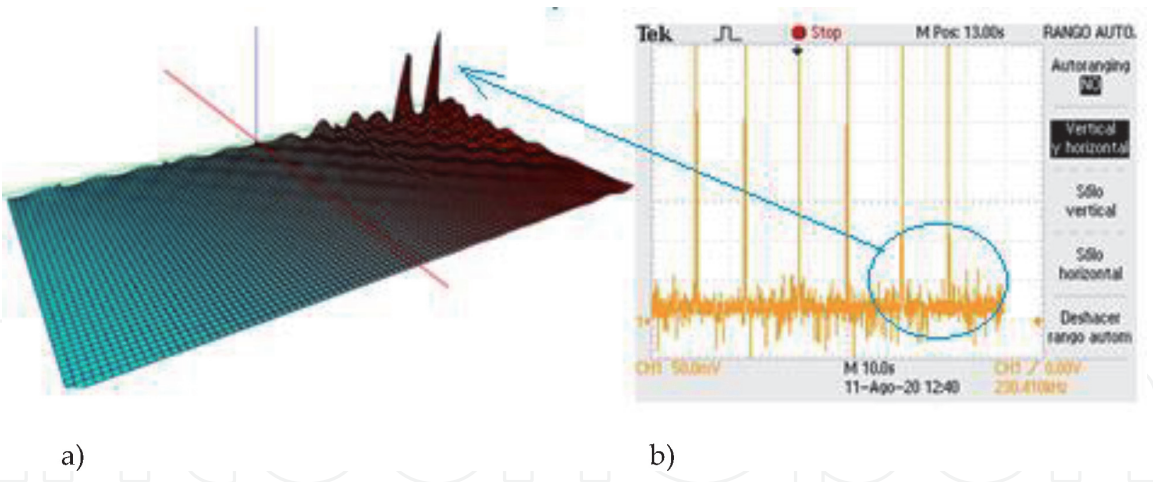


Figure 2.
(a). The corresponding solution to the field equation in cylindrical regime is $Z = \exp(-0.5(x + 1))\text{Bessel}Y(0.5x, 8y)\sin(7x)\text{Bessel}J(0.3y, 20)$. The rotation of cylinder was realized b). (b) Corresponding signals detected in the torsion detection and showed in the wave generator, under electronics measuring conditions: frequency of 235 kHz, wave sample of 13 seconds, voltage of 4 Volts (Figure 3a)).

From a point of view of an electronics study [10] (using a magnetic Hall sensor¹) was obtained an evidence of the existence of torsion as field observable, where was used a magnetic particle as dilaton [5, 6] moving through of a trajectory whose torsion is constant in all space [4]. Likewise, was obtained the signal²:

$$\tau(\omega) = \frac{1}{2\pi l^3} \int_{-0.5s}^{+0.5s} \Pi\left(\frac{t}{1}\right) e^{-j\omega t} dt = \frac{1}{2\pi} \left[\frac{(2.5V - \tilde{\alpha})b}{l^3} \right] \frac{\sin(0.5\omega)}{0.5\omega}, \quad (1)$$

which belongs to the signals set that evidence the torsion under permanent torsion conditions:

$$\left\{ \frac{\sin \omega L}{\omega L}, \frac{\sinh \omega L}{\omega L}; \frac{\cos \omega L}{\omega L}, \frac{\cosh \omega L}{\omega L} \right\}, \forall L = \frac{n2\pi t}{\omega T}, T > 0 \quad (2)$$

¹ **Lemma** [10]. We consider a sensor Hall device $\mathcal{L}_{\text{Hall}}^H$. The current deflection detected for the magnetic field change in the sensor produces per volume unit a torsion energy:

$$\tau = \frac{V}{2\pi} \frac{b}{(a^2 + b^2)} \frac{1}{l} \left(= \frac{\text{Volts}}{(\text{meter})^3} \right).$$

² The torsion is detected with conditions of movement. Likewise, by the lemma 3. 1 [10], the produced magnetic field in the dilaton must be corresponding to

$$H = \frac{I}{2\pi l^3} a^2,$$

whose magnetic field of the dilaton must be decreasing in the cycles for seconds of the turns for that these are detectable by the Hall type sensor (with low velocity). Then is conditioned the signal the initial constant voltage signal

$$V_0 = \Pi\left(\frac{t}{13}\right) = \begin{cases} 2.5V - \alpha & |t| \leq 0.5s \\ 0 & |t| \geq 0.5s \end{cases},$$

which is a rectangular signal of conditioning. Here $\tilde{\alpha}$, is an amplifier factor of the voltage for be detectable.

In our experiments and for our case the spin/waves detection are very little, and need signals filters to obtain a signal in a time range of the 10 seconds, at least. The corresponding screen and 2-dimensional spinor surface $s(\omega_1, \omega_2)$ can be viewed in the **Figures 3a** and **4b**. The oscillations are little and the dilaton or particle reveals the torsion in the space–time [2, 4] under action of an electromagnetic field considering the kinematic invariance. Then chooses a trajectory in our electronic device of constant torsion (**Figures 3c** and **4**) [11].

Conjecture 2.2 (F. Bulnes) [9, 10]. The torsion is the geometrical invariant of the interaction between energy and space.

The appearing of waves in the space–time agitation is due the energy agitation of the particles that from their spins, are interchanging by the screw effect generated by the force $\delta(t_1, t_2)$ (see the **Figure 4**).

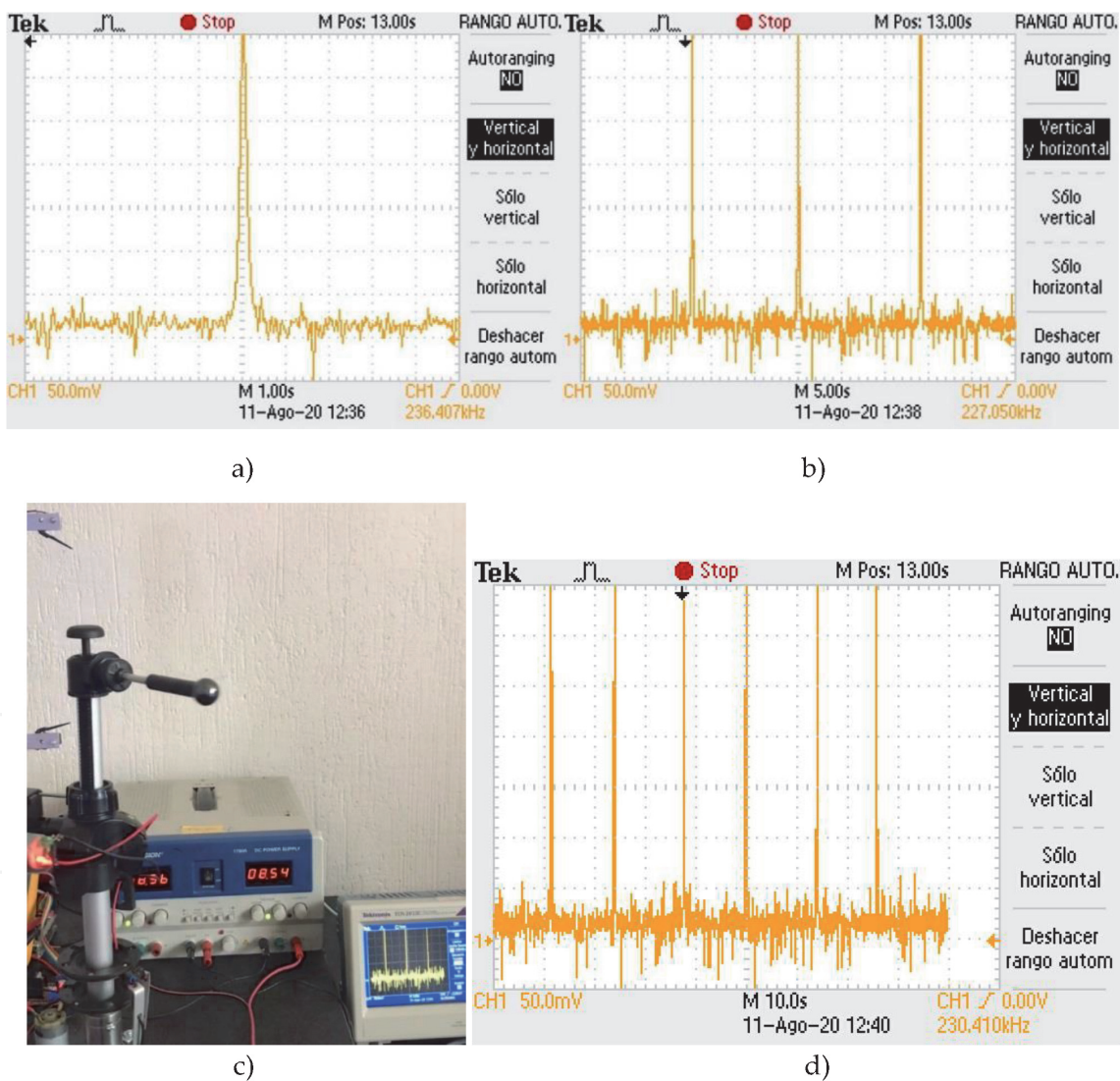


Figure 3. (a) Energy spectra obtained for the conditioning of voltage signals. (b) This represents a quasi-periodic signal where in each 14 seconds to risk a pico-voltage V_p , when the dilaton spins to a velocity of 12 rpm, where is observed that their amplitude is very major than the subsequent amplitudes until to risk a new maximum V_p . (c). The frequency ω , is maintained in a 227 to 236 kHz range. In the sensing process was realized a closer of the energy spectra 1 sec/div (figure a)) to 5 sec/div (figures b, c) and 10sc/div (figure d)) to 50 mV for the three cases. We consider a conditioning of the signal through the operational amplifier of instrumentation AD620, which permit us view an output voltage proportional to 1.4 mV per Gauss detected.

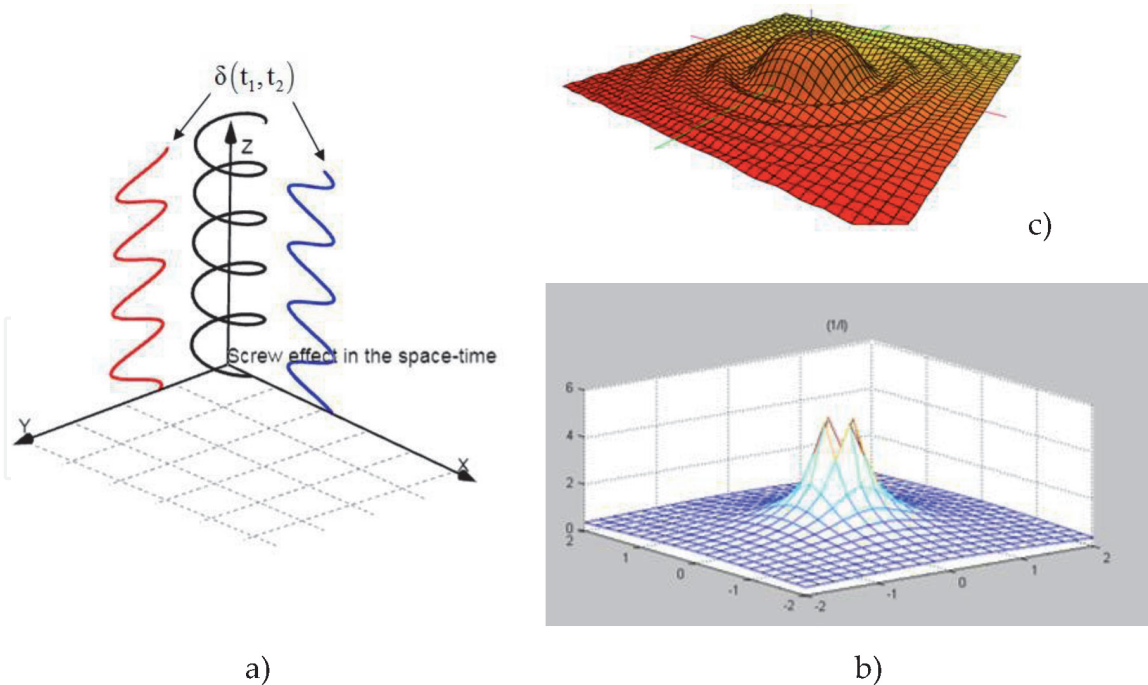


Figure 4.
 (a). The screw effect in the space-time. (b). Mono-pole of electromagnetic field. This represents only $\delta(t_1, t_2)$, of a field source in the space-time, whose torsion is established in the Z-axis. (c). 2-dimensional surface shows the field source with torsion effect waving the 2-dimensional surface around the source.

3. Other cosmological phenomena re-interpretations related to 2D and 3D-torsion geometrical models and the signal analysis realized

In the studies of the Universe the creation of geometrical models or numerical simulation of the space-time phenomena is more complicated and obeys to a re-interpretation that obeys a modern field theories and cohomology theory of topological spaces, even the incorporation of microscopic theories of the Universe, because here are cause of all phenomena in the Universe.

However, as has been said the most important geometrical invariant is the curvature, being the torsion a second curvature.

For example, a re-interpretation that obeys a modern field theories and cohomology theory of topological spaces, with the incorporation of microscopic theories of the Universe can be established as follows.

We can create a 2D-numerical model of the screw effect and re-interpretation in the cosmology objects as black holes or sources as stars or behavior intersidereal magnetic alignment of galaxies, using 2-dimensional complex surfaces considering the Morera's and Cauchy-Goursat's theorems to be evaluate them and can be applied in an numerical program. For example, on singularities or poles in the space-time, considering the space-time a complex Riemannian manifold with singularities. This could represent the surface of the real part of the function $g(z) = \frac{z^2}{z-1}$. The moduli space of this point is less than 2 and thus lie inside one contour. Likewise, the contour integral can be split into two smaller integrals using the Cauchy-Goursat theorem having finally the contour integral [12] $\oint_C g(z) dz = \oint_C \left(0 - \frac{1}{z-z_1}\right) dz = 0 - 2\pi i = -2\pi i$, (see the **Figure 5a**). Likewise this value is a traditional cohomological functional element of $H^f(\Pi - \mathcal{C}', \Omega^f) = \mathbb{C}$. This element is a contour around the singularity as can be viewed in the **Figure 5a**.

Form a cosmological evolution, the torsion play a fundamental role in the forming of all interstellar objects, even the Universe itself. The macroscopic density

fluctuations are echoes from big-bang until today “Large CMB” (where quantum field fluctuations had place (**Figure 5**)).

Likewise, from a point of purely cosmological view, the existence of these singular points reveals the existence of sidereal objects where big quantities of flow (using Poincaré arguments) of energy are expulsed or/and attracted along the space–time as twistors satisfying the geometrical Penrose model of a black hole. The torsion as field observable always is present. The spins s and $-s$, corresponds to different field interactions whose images can correspond to the twistor spaces \mathbb{P}^+ , and \mathbb{P}^- .

Here we can incorporate the following cohomology space that re-interprets field theory objects with geometrical objects considering the Universe as complex Riemannian manifold (topological space) to a field source:

$$H^1(\mathbb{P}T, O(-2h-2)) \cong \ker(U, h(k)) = \{\varphi \in C^2(U) | h(k)\varphi = 0, \text{ in } U \subset \mathbb{M}\}, \quad (3)$$

The field torsion results evident with some work on twistor-spinor framework [7, 9], and using the electronics interpretations studied in other additional experiments that extend the design of experiments in electronics and realized in our researches.

A study realized from a point of view of the mathematical physics and particle physics carries to the following conjecture, considering the particle fermion with boson gauge for torsion and called broson.

Conjecture 3.1 (F. Bulnes, M. Ramírez, L. Ramirez, O. Ramírez). The macroscopic image of the broson actions must be a flow electro-gravitational energy

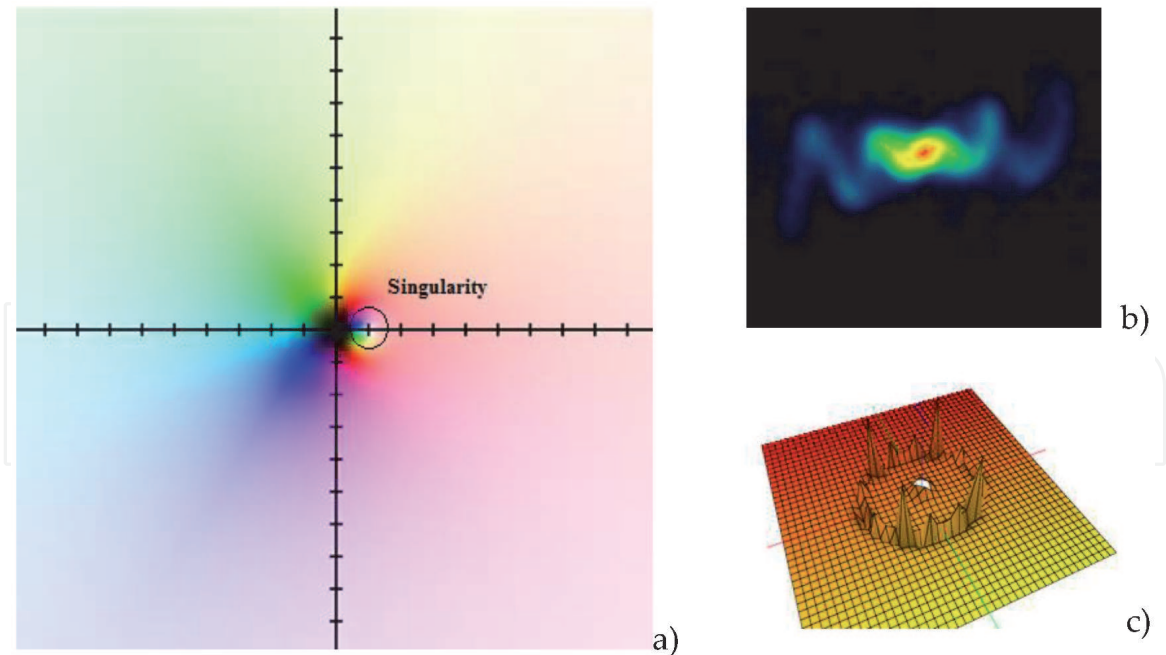


Figure 5.

(a). Pole or singularity of the complex function $g(z) = \frac{z^2}{z-1}$. (b). The black hole with astronomic catalogue SS 433 is a giant black hole that wobbles. With the VLA and the VLBA, we have watched the wiggle of its jets over time. Here spectral image, we can see its corkscrew appearance obtained for the screw effect. This appearance obeys to the agitation produced by the gravitational field and electromagnetic fields due the particles around (right-handed neutrinos keV) of the black hole in the vacuum space. (c). Source 2-dimensional model considering the little perturbations in its horizon detected in neighborhood of the source (also can be considered as singularity type. For example a peak or cusp). The surface is $Z = (0.2 \coth(-0.2 \ln(0.3x^2 + 0.2y^2))) / (x^2 + y^2)$ where happens the perturbation phenomena. This surface represents a quantum field fluctuations in the beginning of the Universe from big-bang stage until any stage of the space–time evolution before of the baryogenesis.

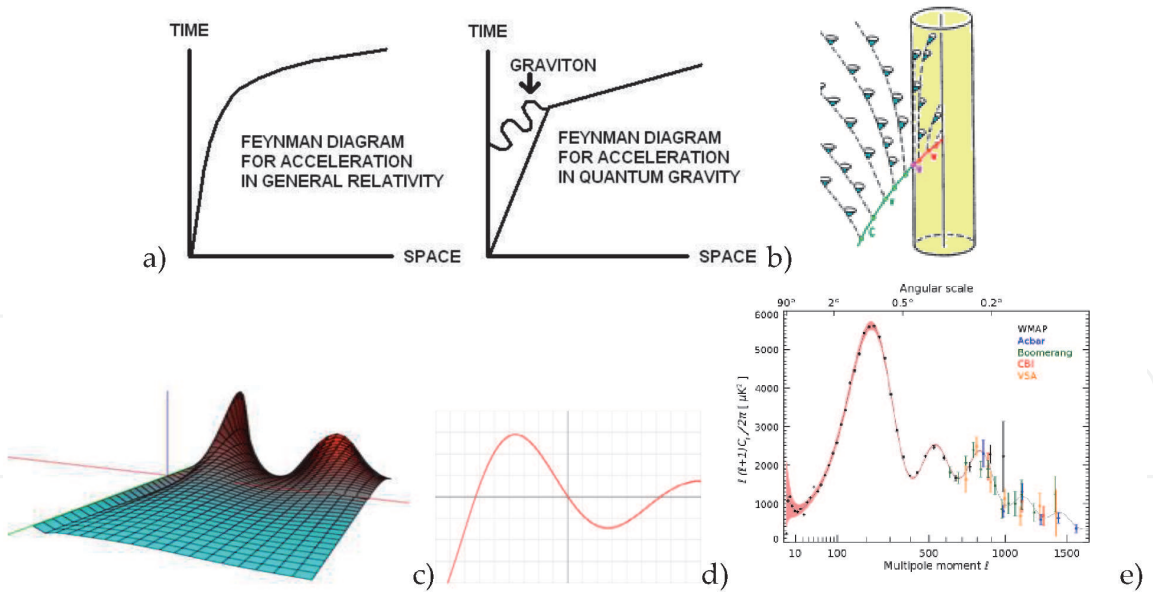


Figure 6.
 (a) The curvature can be measured to quantum level [8] as distortions given by the link-wave between a hypothetical particle as dilaton (gauged graviton) and the trace on relativistic Feynman diagram followed in quantum gravity [5, 8]. (b) The torsion in the case of the cylindrical trajectory, for different times and considering the causality structure of the space–time, can be determined by different deviations to the world lines in each case having as microscopic oscillations predicted by the Majorana fermions [16]. (c) [15]. Microscopic perturbation on a cylindrical surface. Also is considered the causal structure given by light cones. The red segment in the **Figure 6b**, corresponds to the surface model given in 9c). (d). Curve of the cylindrical waves. (e). Observe that similar waves of the spectrum power of CMB radiation temperature anisotropy in terms for 90° until 0.4° to the multi-pole moment. Remember the relation of singularities with the field torsion in the aspect of big production or decaying of energy.

whose micro-states begin from the actions of non-Abelian fields that are measured by the gauge fields.

Definition 3.1. A broson is a hypothetical particle that is a fermion and that come from the Branes, being this hypothetical particle wrapped by gauge bosons in the space–time [13].

The value of broson is the intrinsic geometry of the torsion as field observable, associated to a bundle. In field theory can be considered a framework operator belonging to certain algebras (can be quantum algebras) that comply with certain conditions to solve field equations (as Dirac equation for example $(P + \chi T)\phi_\mu^a = 0$) using **H**-states (states or densities in a Hamiltonian manifold, are not **H**-particles necessarily) as basis [14]. Likewise, the Dirac equation can take the following form:

$$d\mathbf{h} = 0, \quad \forall \mathbf{h} \in \mathbf{H}, \quad (4)$$

The gauge bosons produce torsion in the microscopic space due the electromagnetic characteristic of these bosons that are photons [15] realizing backreaction with the covered space by the gravity. As a result pending for prove will be:

Theorem (F. Bulnes) 3.1. We consider the space–time with CPVT effects. The **H**-torsion is the deformation energy between neutrinos and antineutrinos or curvature/fermion spin energy (space–time-curvature/spin couplings between fermions/anti-fermions).

4. Conclusions and future research

The way of the evolution of the Universe depends of the mechanism between the vacuum space, where live fields of particles and the energy derived from the

field interaction. This mechanism due the conjecture 2.1, in the section 2, explain the possible field interacting in the space as oscillations born from the microscopic space–time characteristics.

However, considering the limitations of our experiments with electronic devices only we can see and interpret with arguments of geometry, certain traces of electronic signals that evidences the torsion under a magnetic field determined in certain voltage range and a movement of cylindrical trajectory, which as we know, is the constant torsion. However, this verifies the conjecture 1.2., and some theorems established in other studies in theoretical physics and mathematical physics.

One of the future goals is obtain advanced Hall magnetic sensor designed inside the quantum electronics, which permits an evidence of torsion more clear and no so depending of the geometry restrictions as a trajectory of constant torsion, without the managing of a dilaton and more sensible of the microscopic environment and the presence of gravity. This will have that to be through the fermions differencing in the non-harmonic analysis that appear in the anti-symmetric behavior of the curvature energy measured from field interactions [8].

The applications of torsion further of Universe understanding, are diverse and much, with vanguard technological developments:

- Advanced vehicles of anti-gravitation and electromagnetic impulse,
- Total control of the mind, conscience and brain,
- Quantum Communication,
- Nanomedicine: Spintronics and radionics devices of total cure,
- Artificial intelligence: advanced positron brains,
- More understanding of the Universe: deep understanding

If we consider the multi-poles as the sources of the electromagnetic nature of the space–time (of fact their moduli stack is obtained by equivalences in field theory using some *gerbes* of derived categories as has been mentioned in field theory in some before works [17]), we can to use the loops around of these poles as contours of the cohomological functionals $H^1(\Pi - \coprod, \mathcal{O}(V)) = \mathbb{C}$, [18, 19] to evaluate through the residue theorem their energy and these values that are amplitudes, can be used in spinor waves, of fact we can consider the partial wave expansions of the space–time suggested by the conformal actions in 4-dimensional and 2-dimensional spaces.

The Conway integrals can be considered in axisymmetric boundaries and also non-axisymmetric cases where matter is confined within axisymmetric boundaries, for example in a galaxy. If we consider the electromagnetic nature of the iso-rotations for magnetic intersidereal fields in galaxies, we need other formalism based in twister geometry, where elliptic integrals are analogues in the space $H^1_{\mathcal{C}}(U'', \mathcal{O}(-2))$.

The cohomological analogous are “poles” which can be interpreted as “sources” of electromagnetic radiative energy (see the **Figure 7**).

Finally, is opportune to sign that the methods and results of the research are numerical simulations (much 2D and 3D-dimensional geometrical models and some analogies with the sidereal objects), on themes parallel and related to the gravity (no gravity precisely) considering the torsion methods and experiments of our torsion theory as analogous to detect gravity waves, but in this case detect waves of torsion in an indirect way.

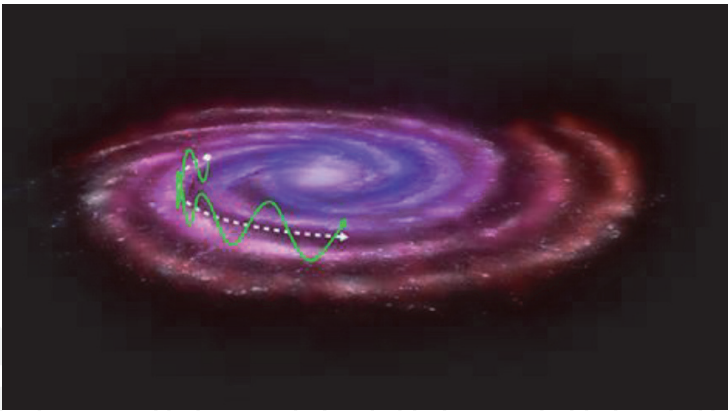


Figure 7. The responsible electromagnetic energy of the accretion and iso-rotation of a galaxy through its spinor representation [18, 19]. This responsible electromagnetic energy can be proved that is torsion energy.

Technical notation and singles

$\delta(t_1, t_2)$	2-dimensional impulse function. Here $t_1 = t_2$, where $\delta(t_1, t_2) = \delta(t)\delta(t) = \delta^2(t)$.
H	Magnetic field produced in the dilaton during the sensing process of the Hall torsion sensor.
H	Hopf algebra which is an operators algebras of quantum field states. This also can be identifying as a Hamiltonian densities manifold. In mathematical physics and derived geometry is interpreted as Higgs states algebra.
$H^1_{\mathbb{C}}(U'', \mathcal{O}(-2))$	Cohomological group or space of integrals of the field equations whose sheaf holomorphic vector bundle of helicity -2 , has algebraic representation through a lines bundles whose polynomials have zeros in the poles or singularizes evaluated by Conway integrals, for example.
\mathbb{M}	Complex space–time.
τ	Torsion. Here in our research is torsion energy.
$\tau(\omega_1, \omega_2)$	Spectral torsion. Torsion energy.
mV	Mili-volts.
$h(k)$	Differential operator of the field equation with helicity $h(k)$. This differential operator appears in the wave equation of electromagnetic field.
VLBA	Very Long Baseline Array. Term in astrophysics referred to a system of ten radio telescopes which are operated remotely from their Array Operations Center located in Socorro, New Mexico.
keV	Kilo-electron-volts. Energy unity that corresponds to $1,6 \times 10^{-19}$ joules.
$H^1(\Pi - \coprod, \mathcal{O}(V)) = \mathbb{C}$	Cohomological functional. Contents all complex values of cohomological contours to singularities which as poles are evaluated by Cauchy integrals, Conway integrals and extensions of these. This cohomological equality of spaces represents all these integrals.
VLA	Radio-astronomical observatory (called Karl G. Jansky Very Large Array (VLA)) is located to an altitude 2124 meters over sea level.
Large CMB	Cosmic Microwave Background of Large range.

$s(\omega_1, \omega_2)$	Spectral spinor surface. This in the quantum case models the gravitational waves related with the field torsion.
CPTV	Violation of the CPT.
H-Torsion	Torsion of the H -states.
ω	Angular frequency given for $\omega = \frac{2\pi}{T}$, $T > 0$.
CPT	In particle physics means Charge-Parity-Time. It is a symmetry type which establish rules of symmetry or invariance of physical laws that permit the simultaneous transformation between these. For example, the spatial inversion can be achieved with spin inversion, which is a parity inversion in particles.
O_μ^a	Cartan tetrad symmetric (or anti-symmetric) tensor component for unify the gravity with electromagnetism in a simply way. This represents a 4-metric tensor component use to the torsion of the gravity actions. With movement this could be the kinematic tensor required in the equivalences between twistors with spinors, in twistor geometry.
SS 433	Binary system of X-rays SS433 located in the Eagle constellation. The singles and number means Star Spectrum (intersidereal object observed only with radiotelescopes). The number is the corresponding number of the observed object of this type. Also known as V1343 Aquilae, located at 5.5 kpc in the galactic plane ($l = 39.7^\circ$ and $b = -2.2^\circ$).
$(P + \chi T)$	Differential Dirac operator of the Dirac field equation.
P	D’Alambert operator equal to $\frac{\partial^2}{\partial t^2} - \left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2} \right)$.
H-states	States or Higgs fields of H . In general these are boson or fermion states.

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